

Operating manual

Version 2.0.2

Bench drill

OPTidrill®
DX I7V

Item no. 3020170



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Preface

Dear customer,

Thank you very much for purchasing a product made by OPTIMUM.

OPTIMUM metal working machines offer a maximum of quality, technically optimum solutions and convince by an outstanding price performance ratio. Continuous enhancements and product innovations guarantee state-of-the-art products and safety at any time.

Before commissioning the machine please thoroughly read these operating instructions and get familiar with the machine. Please also make sure that all persons operating the machine have read and understood the operating instructions beforehand.

Keep these operating instructions in a safe place nearby the machine.

Information

The operating instructions include indications for safety-relevant and proper installation, operation and maintenance of the machine. The continuous observance of all notes included in this manual guarantee the safety of persons and of the machine.

The manual determines the intended use of the machine and includes all necessary information for its economic operation as well as its long service life.

In the paragraph "Maintenance" all maintenance works and functional tests are described which the operator must perform in regular intervals.

The illustration and information included in the present manual can possibly deviate from the current state of construction of your machine. Being the manufacturer we are continuously seeking for improvements and renewal of the products. Therefore, changes might be performed without prior notice. The illustrations of the machine may be different from the illustrations in these instructions with regard to a few details. However, this does not have any influence on the operability of the machine.

Therefore, no claims may be derived from the indications and descriptions. Changes and errors are reserved!

Your suggestion with regard to these operating instructions are an important contribution to optimising our work which we offer to our customers. For any questions or suggestions for improvement, please do not hesitate to contact our service department.

If you have any further questions after reading these operating instructions and you are not able to solve your problem with a help of these operating instructions, please contact your specialised dealer or directly the company OPTIMUM.

Optimum Maschinen Germany GmbH

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1 Safety

Glossary of symbols

▶	provides further instructions
→	calls on you to act
□	enumerations

This part of the operating instructions

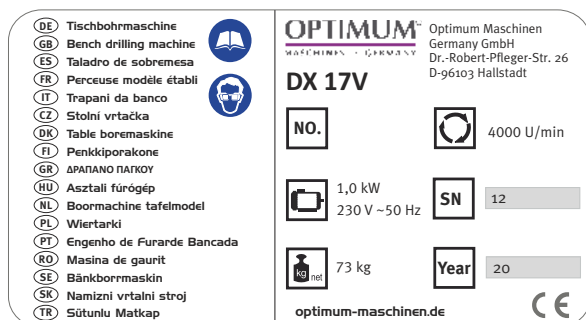
- explains the meaning and use of the warning notes included in these operating instructions,
- defines the intended use of the drilling machine,
- points out the dangers that might arise for you or others if these instructions are not observed,
- informs you about how to avoid dangers.

In addition to these operation instructions, please observe

- the applicable laws and regulations,
- the statutory provisions for accident prevention,
- the prohibition, warning and mandatory signs as well as the warning labels on the drilling machine.

Always keep this documentation close to the drilling machine.

1.1 Type plate



INFORMATION

If you are unable to rectify an issue using these operating instructions, please contact us for advice:

Optimum Maschinen Germany GmbH
Dr. Robert-Pfleger-Str. 26

D-96103 Hallstadt

Email: info@optimum-maschinen.de



1.2 Safety instructions (warning notes)

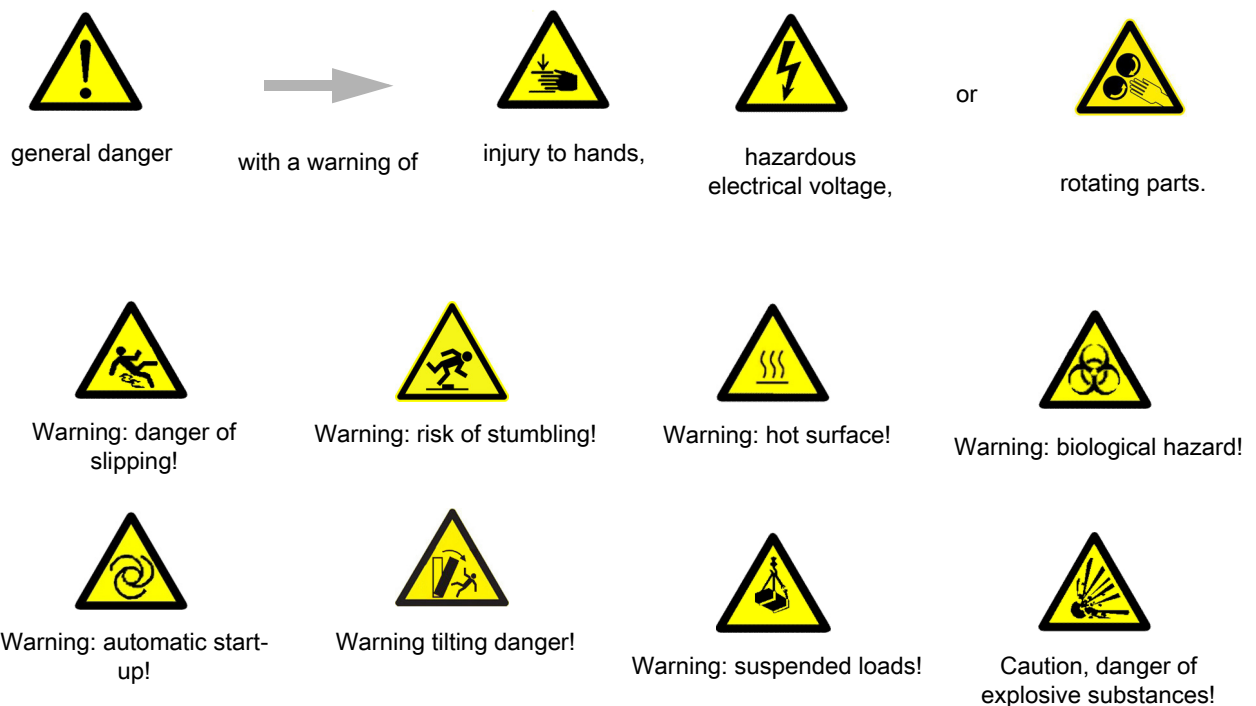
1.2.1 Classification of hazards

We classify the safety warnings into different categories. The table below provides an overview of the classification of symbols (ideogram) and the warning signs for each specific danger and its (possible) consequences.

Symbol	Warning alert	Definition / consequence
	DANGER!	Impending danger that will cause serious injury or death to people.
	WARNING!	A danger that can cause serious injury or death.
	CAUTION!	A danger or unsafe procedure that can cause personal injury or damage to property.
	ATTENTION!	Situation that could cause damage to the drilling machine and products and other types of damage. No risk of injury to people.
	Information	Practical tips and other important or useful information and notes. No dangerous or harmful consequences for people or objects.

1.2.2 Other pictograms

In case of specific dangers, we replace the pictogram with





Activation forbidden!



Use ear protection!



Read the operating instructions before commissioning!



Disconnect the mains plug!



Wear protective glasses!



Wear protective gloves!



Wear safety shoes!



Wear a protective suit!

1.3 Intended use

WARNING!

In the event of improper use, the drilling machine

- will endanger personnel,
 - will endanger the machine and other material property of the operating company,
- the correct function of the drilling machine may be affected.



The drilling machine is designed and manufactured to be used in a non-explosive environment. The drilling machine is designed and manufactured for holes in cold metals or other non flammable materials or that not constitute a health hazard using a rotating filing-stripping tool that has a number of grooves for collecting the filings.

If the drill is used in any way other than described above or modified without the approval of Optimum Maschinen Germany GmbH, the drill is being used improperly.

We will not be held liable for any damages resulting from any operation which is not in accordance with the intended use.

We expressly point out that the guarantee or CE conformity will expire due to any constructive technical or procedural changes which had not been performed by the company Optimum Maschinen Germany GmbH.

It is also part of intended use that you

- observe the limits of the drilling machine,
- the operating manual is observed,
- the inspection and maintenance instructions are observed.

► Technical specification on page 12

WARNING!

Extremely severe injuries.

It is forbidden to make any modifications or alternations to the operation values of the drilling machine! They could endanger the personnel and cause damage to the drilling machine.



INFORMATION

The control and drive components of the bench drilling machine are approved for industrial and commercial use within industrial supply systems. Utilization in public supply systems requires another configuration and/or additional measures.



WARNING!

The bench drill is not intended for use in residential facilities where the power is supplied via a public low voltage supply system. In these areas, it may be difficult to guarantee electromagnetic compatibility due to conducted and emitted interference.



1.4 Reasonably foreseeable misuses

Any other use other than that specified under "Intended use" or any use beyond the described use shall be deemed as non-intended use and is not permissible.

Any other use has to be discussed with the manufacturer.

It is only allowed to process metal, cold and non-flammable materials with the drilling machine.

In order to avoid misuse, it is necessary to read and understand the operating instructions before first commissioning.

The operators must be qualified.

1.4.1 Avoiding misuse

- Use of suitable cutting tools.
- Adapting the speed adjustment and feed to the material and workpiece.
- Clamp workpieces firmly and vibration-free.

WARNING!

Risk of injury caused by workpieces flying off. The workpiece must always be fixed with a machine vice, jaw chuck or by other appropriate clamping tool, such as clamping claws.



Clamp the workpiece in the machine vice. Make sure that the workpiece is firmly clamped in the machine vice resp. that the machine vice is firmly clamped on the machine table.

- Use cooling and lubricating agents to increase the durability of the tool and to improve the surface quality.
- Clamp the cutting tools and workpieces on clean clamping surfaces.

When drilling, ensure that

- the suitable speed is set depending on the diameter of the drill,
- the pressure must only be such that the drill can cut without load
- in case of too strong pressure the drill will get worn early or even might break resp. get jammed in the hole. If the drill jams, immediately stop the main motor by pressing the emergency stop switch,
- for hard materials, e.g. steel, use commercial coolants or lubricating agents.
- generally always drive the turning spindle out of the workpiece.

INFORMATION

The drilling machines with frequency converter for regulating the speed are built according to the standard EN 61800-3 class C2.



WARNING!

This machine is not intended for use in residential buildings, in which the power supply is provided via a public low voltage supply system. In these areas it may possibly be difficult to guarantee electromagnetic compatibility due to lead bound as well as emitted interferences.



Overview of the EMC categories:

Categorie C1

- required limit values Class B Group 1 according to EN 55011

Categorie C2

- Required limit values class A Group 1 according to EN 55011, Installation by EMC experts and warning: "This is a product of category C2 according to EN 61800-3. This product may cause radio interference in a residential area. In this case, it may be necessary for the operator to take appropriate action."

Categorie C3

- Required limit values class A group 2 according to EN 55011, whereby these limit values are below those of class A group 1, plus warning: „This type is not suitable for connection to a public low-voltage network supplying residential buildings. When connecting to a public low voltage network, radio frequency interference is expected. "

This machine	☐	☒	☐	☐
Categorie	C1	C2	C3	C4
Environment	Residential area Business area Industrial area		Industrial area	
Voltage / Current	< 1000 V			> 1000 V
EMC knowledge	no requirement	Installation and commissioning by an EMC expert		

1.5 Possible dangers caused by the drilling machine

The drilling machine is state-of-the-art.

Nevertheless, there is a residual risk as the drilling machine operates with

- at high speeds,
- rotating parts,
- electrical voltage and currents.

We have used construction resources and safety techniques to minimize the health risk to personnel resulting from these hazards.

If the drilling machine is used and maintained by personnel who are not duly qualified, there may be a risk resulting from incorrect or unsuitable maintenance of the drilling machine.

INFORMATION

Everyone involved in the assembly, commissioning, operation and maintenance must

- be duly qualified,
- strictly follow these operating instructions.

In the event of improper use

- there may be a risk to personnel,
- there may be a risk to the machine and other material values,
- the correct function of the drilling machine may be affected.

Always disconnect the drilling machine, and upright drill if cleaning or maintenance work is being carried out.

WARNING!

The drilling machine may only be used with functional safety devices.

Disconnect the drilling machine immediately, whenever you detect a failure in the safety devices or when they are not fitted!

All additional devices installed by the operator have to be equipped with the prescribed safety devices.



This is your responsibility being the operating company!

► **Safety devices on page 9**

1.6 Qualification of personnel

1.6.1 Target group

This manual is addressed to

- ☐ the operating companies,
- ☐ the operators,
- ☐ the maintenance personnel.

Therefore, the warning notes refer to both, operation and maintenance personnel of the drilling machine.

Lock the main switch. This will prevent it from being used by unauthorized persons.

Obligations of the operating company

- ☐ train the personnel,
- ☐ instruct the personnel in regular intervals (at least once a year) on
 - all safety standards that apply to the machine,
 - the operation,
 - generally accepted engineering standards.
- ☐ check the personnel's knowledge level,
- ☐ document the trainings/instructions,
- ☐ require personnel to confirm participation in training/instructions by means of a signature,
- ☐ check whether the personnel is working in a safety and risk-conscious manner and following the operating instructions.
- ☐ define and document the inspection deadlines for the machine in accordance with the Factory Safety Act and perform an operational risk analysis in accordance with the Work Safety Act.

Obligations of the operator

- ☐ obtain training in handling the drilling machine,
- ☐ know the function and mode of operation,
- ☐ before taking the machine in operation
 - have read and understood the operating manual,
 - be familiar with all safety devices and instructions.

Additional requirements apply for work on the following machine components:

- ☐ Electrical parts or operating agents: shall only be performed by an electrician or under the guidance and supervision of an electrician.

1.7 Operator positions

The operator's position is in front of the drilling machine.

1.8 Safety devices

Use the drilling machine only with properly functioning safety devices. Stop the drilling machine immediately if there is a failure on the safety device or if it is not functioning for any reason. It is your responsibility!

If a safety device has been activated or has failed, the drilling machine must only be used if you

- ☐ the cause of the fault has been eliminated,
- ☐ you have verified that there is no danger to personnel or objects.

1.9 Emergency-stop push button

ATTENTION!

Also after pressing the EMERGENCY-Stop switch, depending on the previously selected speed, the drilling spindle continues to turn for a few more seconds .



1.10 Main switch

WARNING!

Dangerous voltage even if the main switch is switched off.

The areas marked by the pictogram might contain live parts, even if the main switch is switched off.



In the "0" position, the main switch can be secured against accidental or non-authorised switching on. The power supply is interrupted by switching off the main plug.

1.11 Drilling table

Seats for T-slots are attached to the drilling table.

WARNING!

Risk of injury due to workpieces flying off at high speed. Securely fix the workpiece on the drilling table.



1.12 Personal protective equipment

For certain work individual protection gear as protective equipment. This includes:

- ☐ Safety helmet,
- ☐ protective glasses or face guard,
- ☐ protective gloves,
- ☐ safety shoes with steel toe caps,
- ☐ ear protection.

Before starting work make sure that the required personnel protective equipment is available at the work place.

CAUTION!

Dirty or contaminated personnel protective equipment can cause illness.

Clean your personal protective equipment

- ☐ after each use,
- ☐ regularly once a week.

Personal protective equipment for special works

Protect your face and your eyes: Wear a safety helmet with facial protection when performing work where your face and eyes are endangered.

Use protective gloves when handling pieces with sharp edges.

Wear safety shoes when you assemble, disassemble or transport heavy components.



1.13 Safety during operation

WARNING!

Before switching on the drilling machine make sure that there are

- no dangers generated for persons,
- no objects are damaged.



Avoid any unsafe work methods:

- Make sure that nobody is endangered by your work.
- The instructions mentioned in these operating instructions have to be strictly observed during assembly, operation, maintenance and repair.
- Do not work on the drilling machine, if your concentration is reduced, for example, because you are taking medication.
- Observe the accident prevention regulations issued by your Employers Liability Insurance Association or other supervisory authorities responsible for your company.
- Inform the supervisor about all hazards or faults.
- Stay on the drilling machine until the machine completely stopped moving.
- Use the prescribed personnel protective equipment. Make sure to wear a well-fitting work suit and, if necessary, a hairnet.
- Do not use gloves while drilling.

1.14 Safety during maintenance

Inform the operators in good time of any maintenance and repair works.

Report all safety relevant changes and performance details of the drilling machine or their operational behaviour. Any changes must be documented, the operating instructions updated and machine operators instructed accordingly.

1.15 Disconnecting and securing the drilling machine

Switch off the drill with the main switch and lock it so it cannot be activated by unauthorised personnel or switched on by accident.

The main switch can be locked by removing the shift lever.

All machine parts as well as any dangerous voltages are switched off. Excepted are only the positions which are marked with the adjoining pictogram.



1.16 Mechanical maintenance

Reinstall all protection and safety devices after any maintenance work once the work has been completed. This includes:

- covers,
- safety instructions and warning signs,
- grounding cables.

Check if they are working properly!

1.17 Electric

Have the machine and/or the electrical equipment checked regularly. Immediately eliminate all defects such as loose connections, defective wires, etc.

Define and document the inspection deadlines for the machine in accordance with § 3 of the Factory Safety Act and perform an operational risk analysis in accordance with § 6 of the Work Safety Act. ► Electrical connection on page 19

2 Technical specification

The following information represents the dimensions and indications of weight and the manufacturer's approved machine data for following stated machines.

Electrical connection	
230 V / 1 Ph ~50 Hz Setting the basic frequency to 60Hz, see Sinamics V20 operating instructions	
Drive motor power	
	1 kW
Drilling capacity	
Drilling capacity in steel (S235JR)	Ø 16 mm
Continuous drilling capacity in steel (S235JR)	Ø 13 mm
Spindle seat	
	MT2
Spindle stroke	
	60 mm
Dimensions	
	► Dimensions on page 12
Machine weight	
	73 kg
Spindle speeds	
infinitely variable	50 - 4000 min ⁻¹
Emissions	
Maximum sound pressure level at 1 m distance from the machine and 1.60 m above the ground.	72 dB(A) on no load running
Ambient conditions Temperature	
Temperature	5 ~ 35 °C
Relative humidity	25 - 80%

CAUTION!

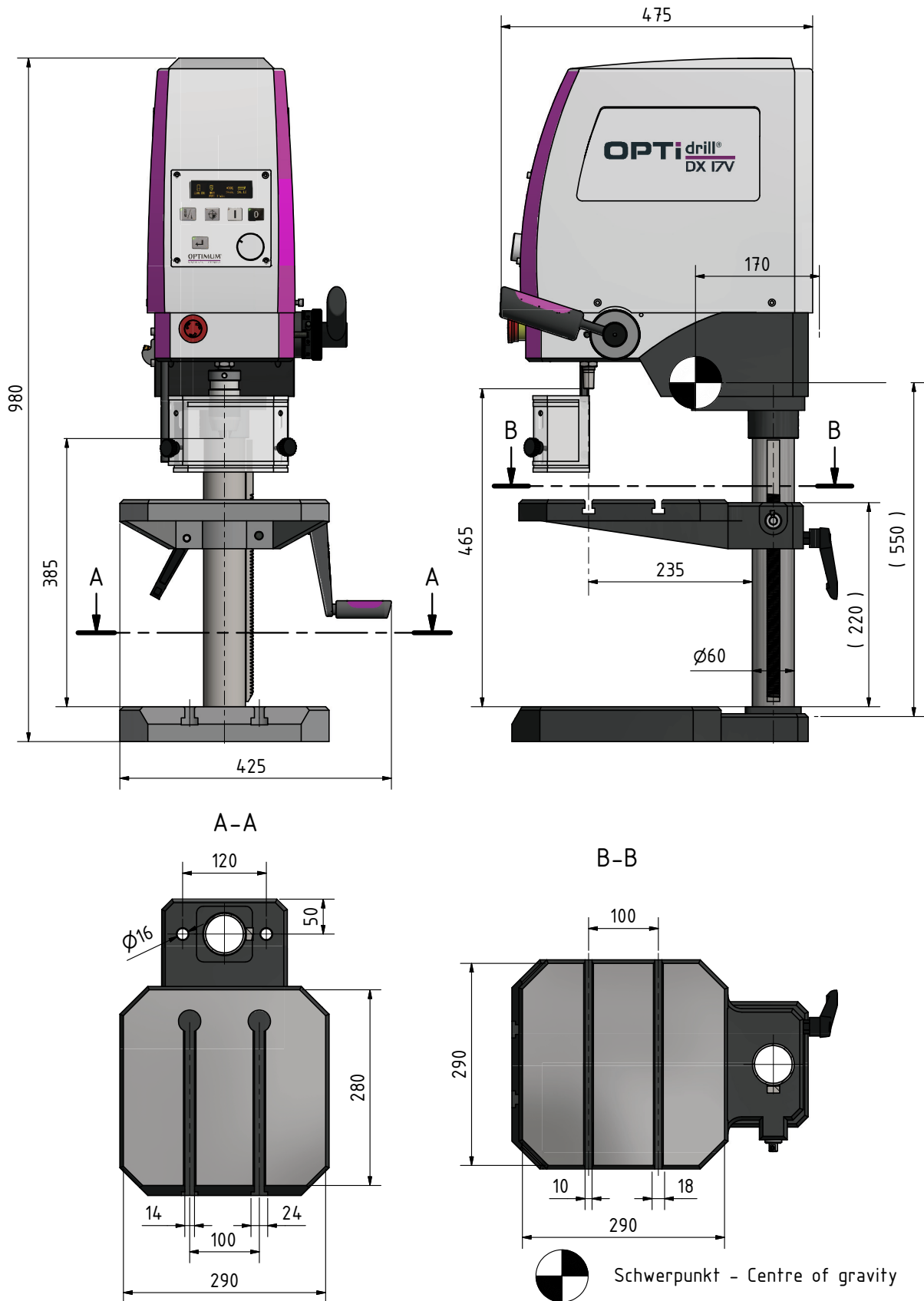
The machine operator should use hearing protection.

INFORMATION

This numerical value was measured on a new machine under the operating conditions specified by the manufacturer. The noise behaviour of the machine might change depending on the age and wear of the machine. Furthermore, the noise emission also depends on production engineering factors, e.g. speed, material and clamping conditions.



2.1 Dimensions



DX17V_GB_2.fm

3 Delivery, interdepartmental transport, assembly and commissioning

3.1 Notes on transport, installation, commissioning

Improper transport, installation and commissioning is liable to accidents and can cause damage or malfunctions to the machine for which we do not assume any liability or guarantee.

Transport the scope of delivery secured against shifting or tilting with a sufficiently dimensioned industrial truck or a crane to the installation site.

WARNING!

Severe or fatal injuries may occur if parts of the machine tumble or fall down from the forklift truck or from the transport vehicle. Follow the instructions and information on the transport box.

Note the total weight of the machine. The weight of the machine is indicated in the "Technical data" of the machine. When the machine is unpacked, the weight of the machine can also be read on the rating plate.

Only use transport devices and load suspension gear that can hold the total weight of the machine.



WARNING!

The use of unstable lifting and load suspension equipment that might break under load can cause severe injuries or even death. Check that the lifting and load suspension gear has sufficient load-bearing capacity and that it is in perfect condition.

Observe the accident prevention regulations issued by your Employers Liability Insurance Association or other competent supervisory authority, responsible for your company. Fasten the loads properly.



3.1.1 General risks during internal transport

WARNING: TILTING DANGER!

The machine may be lifted unsecured by a maximum of 2 cm.

Employees must be outside the danger zone, i.e. the reach of the load.

Warn employees and advise them of the hazard.

Machines may only be transported by authorized and qualified persons. Act responsibly during transport and always consider the consequences. Refrain from daring and risky actions.

Gradients and descents (e.g. driveways, ramps and the like) are particularly dangerous. If such passages are unavoidable, special caution is required.

Before starting the transport check the transport route for possible danger points, unevenness and faults.

Danger points, unevenness and disturbance points must be inspected before transport. The removal of danger spots, disturbances and unevenness at the time of transport by other employees leads to considerable dangers.

Careful planning of interdepartmental transport is therefore essential.



3.2 Unpacking the machine

Transport the drilling machine in its packing crate near its final installation location with a lift truck before unpacking it. If the packaging shows signs of possible transport damage, take the necessary precautions not to damage the machine when unpacking it. If any damage is discovered, the carrier and/or shipper must be notified immediately to be able to initiate the necessary steps for a claim.

Inspect the machine completely and carefully, making sure that all materials, such as shipping documents, manuals and accessories supplied with the machine have been received.

3.3 Transport

The machine can be transported with forklifts or lift trucks. The commonly accepted and local regulations regarding machine transport apply.

3.4 Anchoring the Drill

DANGER!

Danger of crushing and overturning. The drilling machine must be installed by several people.

- Check the horizontal orientation of the drill base with a water bubble level.
- Check that the foundation has sufficient floor-load capacity and rigidity.
- Anchor the machine base or the optional machine base onto the floor before positioning the machine on it.



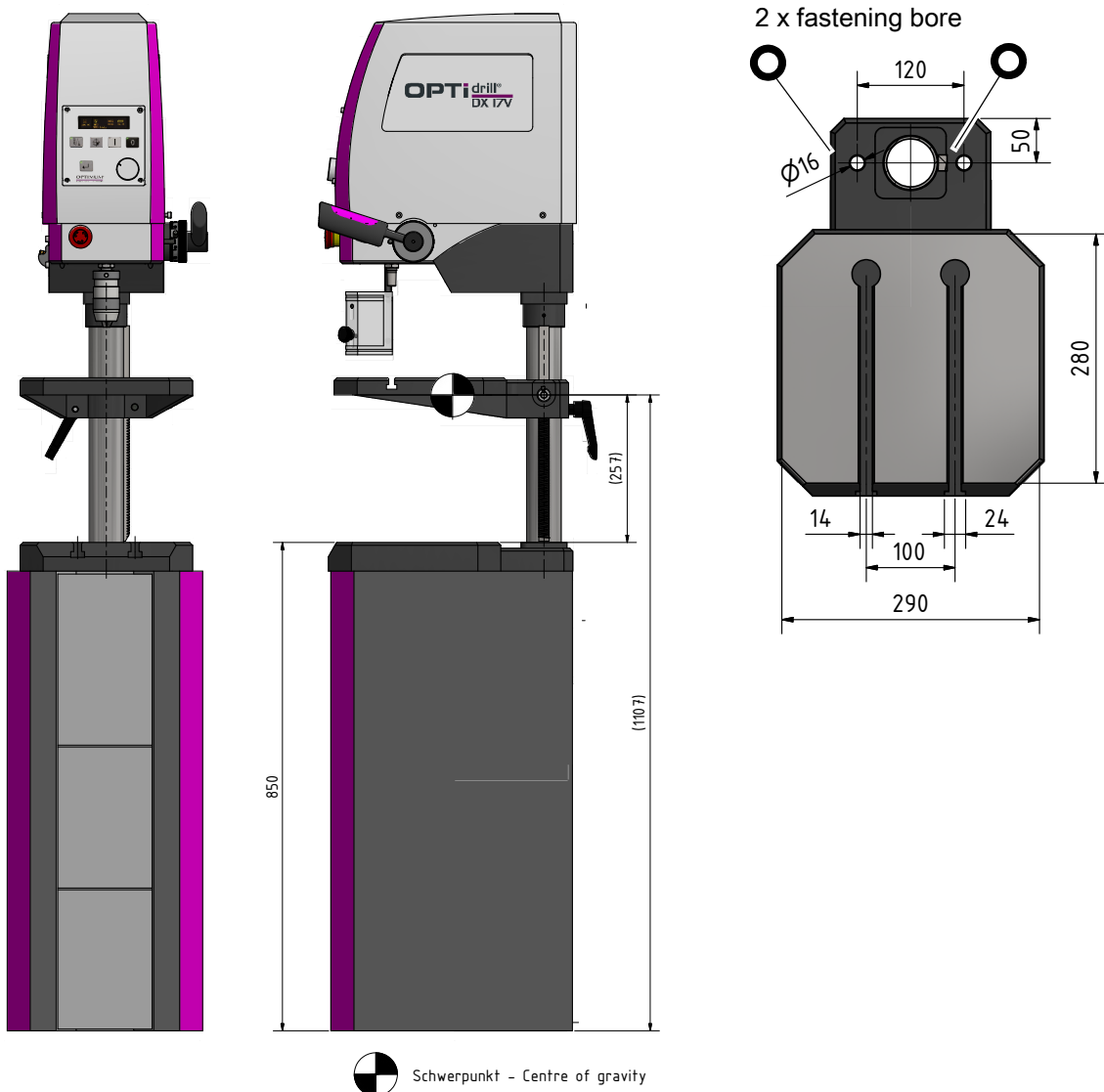
3.4.1 Centre of Gravity Without a Machine Base, ► Dimensions on page 12

3.4.2 Centre of Gravity with an Optional Machine Base

CAUTION!

In order to provide the necessary stability of the machine, the machine must be connected securely to its base. The machine base itself must be fastened firmly to the floor.





Img.3-1: Example with Machine Base 335 3000

3.5 Installation site requirements

Organize the work area around the drill according to local safety regulations. The work area for operation, maintenance and repair must not be restrictive.

INFORMATION

In order to attain good functionality and a high processing accuracy as well as a long service life of the machine, the place of installation should fulfil certain criteria.



Please observe the following points:

- The machine must only be installed and operated in a dry and well-ventilated place.
- Avoid places near machines generating chips or dust.
- The installation site must be free from vibrations also at a distance of presses, planing machines, etc.
- The substructure must be suitable for the drilling machine. Ensure that the floor has sufficient load bearing capacity and is level.
- The ground must be prepared in a way that potential coolants cannot penetrate the floor.
- Any parts sticking out such as stops, handles, etc. have to be secured by measures taken by the customer if necessary in order to avoid endangering persons.
- Provide sufficient space for the personnel preparing and operating the machine and transporting the material.
- Also make sure the machine is accessible for setting and maintenance works.

3.6 Cleaning of the machine

CAUTION!

Do not use compressed air to clean the machine.

Your new drill must be completely cleaned after it is unpacked to ensure that all moving parts and sliding surfaces are not damaged when the machine is operated. Each unit leaves the factory with all exposed parts and sliding surfaces suitably greased to avoid oxidation during the time that elapses before it is placed into operation. Wipe all metallic surfaces with a clean cotton cloth. Clean the plastic parts with cleaning agents suitable for plastic.



3.7 First commissioning

WARNING!

The machine may only be commissioned after proper installation.

If the drilling machine is initially operated by inexperienced personnel, you endanger both people and the equipment. We do not accept any liability for damages caused by incorrectly performed commissioning.



3.8 Warming up the machine

ATTENTION!

If the drill is immediately operated at maximum load when it is cold, it may result in damages to the machine.



INFORMATION

To ensure a long service life of your drilling machine, we recommend that you do not exceed a maximum rotation speed of 500 min⁻¹ during the first hour of operation. If the drill is cold, e.g. immediately after having transported the machine, it should be warmed up at a speed of only 500 1/min for the first 30 minutes.



3.9 Electrical connection

The machine is installed and ready to operate. Please verify if the type of current, voltage and protection fuse correspond to the values specified. A protective earth ground wire connection must be available. Main Fuse 16A. Due to the design, the leakage current is greater than 3,5 mA. We ask for due attention while executing machine tests within the framework of industrial safety guidelines.



The earth leakage current of the SINAMICS V20 inverter is approximately 20 mA at maximum speed. Due to this, a fixed earth connection is required and the minimum size of the protective earth conductor shall comply with the local safety regulations for high leakage current equipment.

The SINAMICS V20 inverter has been designed to be protected by fuses; however, as the inverter can cause a DC current in the protective earthing conductor, if a Residual Current Device (RCD) is to be used upstream in the supply, observe the following:

- The SINAMICS V20 single phase AC 230 V inverters (filtered or unfiltered) can be operated on a type A1) 30 mA or type B(k) 30 mA RCD.
- To use a type A RCD, the regulations in this FAQ must be followed: Siemens Web site (<http://support.automation.siemens.com/WW/view/en/49232264>)

ATTENTION!



Residual currents may already be present at your mains connection, or in the later course of time further residual currents from other devices may be added, which will then cause the residual current circuit breaker in conjunction with the SINAMICS V20 to trip. The 30mA residual current circuit breaker possibly used at your mains connection is then no longer sufficient or is already insufficient when the machine is installed.

In this case it is only possible to use an RCD with 300mA at your mains connection. Whether then the RCD for personal protection with 30mA may be used against a 300mA RCD for fire protection alone, must be clarified by you with your network supplier, or your building insurance, or one of your electricians on site.

Basically, 30mA RCDs are to be found on a normal household connection, which must not be replaced by 300mA RCDs.

Industrial buildings usually have an RCD for fire protection with 300mA.

INFORMATION



The following pages contain general information on the operation of frequency inverters.

3.9.1 Regulated drives in connection with residual current devices

Speed-controlled drives are one of the standard equipment in machine and plant construction and perform various tasks. Compared to a simple motor, the electronic rectifiers or converters require some special features for the necessary safety measures for electrical safety. Depending on the application, the use of a fault current protection device, differential current monitoring or insulation monitoring can make more sense.

For electrical safety, DIN VDE 0100-410 (VDE 0100 part 410): 1997-01 "Erection of heavy current installations up to 1000V" is a basic standard. It describes both, the admissible net forms and the necessary protective measures against dangerous body currents. Based on this standard DIN EN 50178 (VDE 0160): 1998-04 "Equipping of heavy current systems with electronic equipment" specifies the protective measures to be applied to controlled drives in more detail. It calls for: "In the case of electronic equipment, the protection of persons against dangerous body currents must be carried out in such a way that a single fault does not cause any danger."

Regulated drives with residual current devices

The TN-S system is the most common network form for the operation of controlled drives. This is done, among other things, for EMV reasons and to avoid vagabonding currents. In accordance with DIN VDE 0100-410 (VDE 0100-410): 1997-01, fault current protective devices (ELCB) can be used as a protective measure against dangerous body currents. According to DIN VDE 0100-482 (VDE 0100 part 482): 2003-06 "Electrical installations of buildings", cables and wiring systems in fire-endangered plants must be protected by ELCBs with a rated differential current of 300 mA. According to IEC 60755, ELCBs differ in the type of fault currents they can detect. In conjunction with electronic devices currents with DC components may occur.

3.9.2 Protection from Dangerous Shock Currents, use of ELCBs

To achieve increased safety in all installation systems, and in power supply ranges for which the installation provisions stipulate or recommend the ELCB devices.

Measure for "Protection from Dangerous Shock Currents", as regulated in DIN VDE 0100 Part 410. All measures are to be mentioned:

- Protection from indirect contact – as protection against fault by shutting down in the event of inadmissibly high contact voltage by short circuit shock on the operating resource.
- Protection from direct contact – as additional protection by shutting down in the event of contact with a live conductor. Dangerous shock currents are shut down within the shortest possible time, if the rated fault current of the circuit breaker is 30 mA (e.g. Domestic environment), for a personal protection system 10 mA (e.g. Bathroom).
- Fire prevention – Prevention of the origination of electrically-ignited fires if the rated fault current of the circuit breaker is 300 mA. Operating premises at risk of fire to VdS 2033: 2002-02 300 mA (e.g. Factory halls).

3.9.3 Current in the protective earth conductor - Leakage current

With EMC filters in frequency converters, the leakage current is always greater than 3.5 mA due to physics. Some types of frequency converters also achieve a leakage current of up to 300mA.

Therefore, a fixed earth connection is required and the minimum cross section of the protective earthing conductor must conform to local safety regulations for devices with high leakage current. This is achieved by providing a permanent fixed earthing connection with two independent conductors, each having a cross section the same as the power supply cord or greater.

Preferably, machines with frequency converters are therefore to be permanently connected to a terminal box, otherwise an additional fixed earth connection is required, which is not routed over the plug, and must correspond to at least the cross-section of the cable in the plug.

Since a direct current may be caused by the frequency converter in the protective earthing conductor, if an upstream residual current device (ELCB / RCD) is required in the network, the following guidelines must be followed:

To avoid an operating fault, you need an AC/DC-sensitive ELCB. Be absolutely sure which leakage current security is necessary for dangerous body currents, as regulated in DIN VDE 0100 part 410, at your mains connection.

3.9.4 When the ELCB triggers

- Pulse current - sensitive ELCB type A
ELCB type A independent of rated voltage, for triggering when changing fault currents and pulsing DC fault currents. 
- AC/DC - sensitive ELCB type B
ELCBs of series type B also accept the detection of smooth AC fault currents as well as the detection of fault current shapes of type A; they are therefore suitable for all the circuits mentioned. ELCBs of this series therefore detect all types of fault current according to the triggering characteristic B, i.e. both smooth DC fault currents and also all AC fault currents of all frequencies and mixed frequencies up to 1 MHz are detected and switched off reliably in the event of a fault.  
- Alternating current - sensitive ELCBs of type AC (only alternating current) are unsuitable for frequency converters. Alternating current - sensitive ELCBs of type AC are not customarily used and are no longer permitted in Germany. 

Type B must be used with 3-phase converters.

When using an external EMC filter, to avoid false error shutdowns, a time delay of at least 50 ms is required. The leakage current can exceed the threshold trigger value for an error shutdown if the phases are not switched on at the same time.

4 Operation

4.1 Control and indicating elements



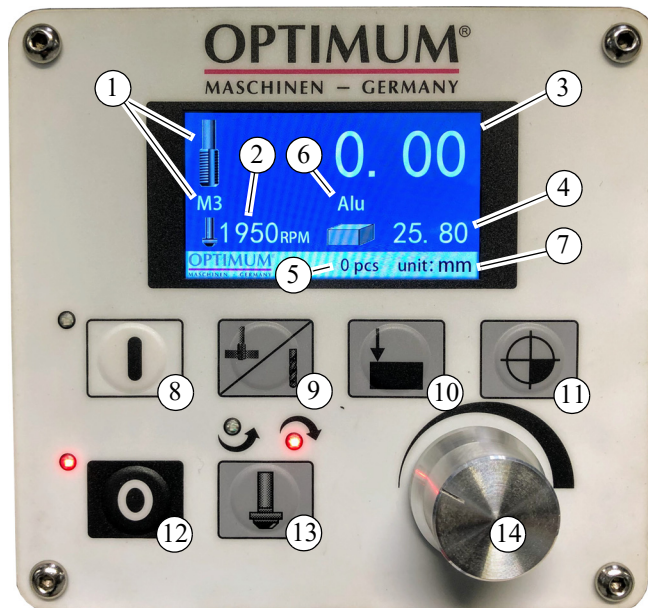
Pos.	Designation	Pos.	Designation
1	Control panel ► Control panel on page 23	2	Emergency-stop switch
3	Drilling lever	4	Clamping lever drilling table
5	Drill depth scale	6	Master switch
7	Drill chuck guard	8	Height adjustment clamping screws for drill chuck protection

4.2 Control panel

The operating panel is largely self-explanatory in its handling. The control panel contains preset, generally valid speeds depending on the tool (1), the tool size and the material (6) of the workpiece.

General entries are set with the control knob (14) and confirmed by pressing the control knob. Entries are completed when the flashing icon is no longer displayed.

After completing all entries, the preset speed can be changed as required with the rotary knob.

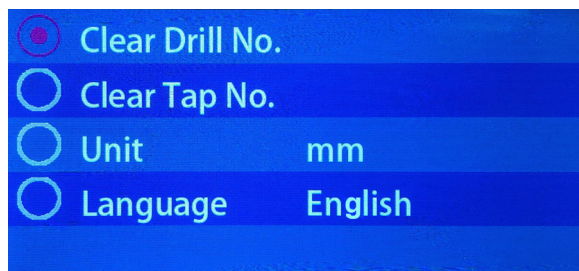


Img.4-1: 0302017041

Pos.	Designation	Pos.	Designation
1	selected tool and tool size	2	Speed display, accuracy $\pm 1\%$
3	current drilling depth and thread depth	4	Set drilling or thread depth as setpoint value
5	Piece counter	6	Material selection, steel or aluminium
7	Set unit, millimetre or inch	8	Spindle rotation ON
9	Tool selection ☐ Drill ☐ Tap	10	Setting the drilling depth with signal tone or thread depth with signal tone and reversal of direction of rotation
11	Setting the zero point (start of workpiece)	12	Spindle rotation OFF
13	Selection of direction of rotation	14	Rotary knob ☐ Turn, set value ☐ Press, confirm value

4.2.1 Basic value setting

To set and change:



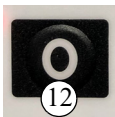
The basic value setting is called up by pressing the tool selection key (9) and spindle rotation OFF (12).



INFORMATION

Press and hold the first key, then press the next key and then release both keys.

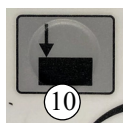
To leave the basic setting, press the key spindle rotation OFF (12).



4.2.2 Drilling or thread depth setting- Signal tone setting

With the push button (10) the drilling depth and thread depth are set with an acoustic signal. In the operating mode thread cutting, the direction of rotation is additionally reversed when the depth is reached.

→ Set with the rotary knob and confirm with the rotary knob by pressing it.



→

INFORMATION

To deactivate the signal tone, set the value to maximum value and adjust the mechanical drill depth stop so that the value is not reached.



4.3 Drill chuck guard

Adjust the guard to the correct height before you start working.

Push the drill chuck protection up or down.

Loosen the clamping screws and adjust the total coverage height.

There is a switch integrated in the spindle protection mounting which monitors the closed position.

INFORMATION

The machine cannot be started, if the drill chuck guard is not closed.



Img. 4-2: Drill chuck guard

4.4 Drilling

- Insert and tighten the drill bit.
- Clamp the workpiece.
- Release emergency stop.
- Close drill chuck protection.
- Put the drill bit with the drilling lever onto the workpiece and set the workpiece zero.
- Select drill tool.
- Select material and drill diameter with the rotary knob and confirm with the rotary knob.
- Actuate spindle rotation ON.

The spindle turns; the holes are drilled.

If necessary, change the preset speed with the control dial.

- Actuate spindle rotation OFF.

4.4.1 Thread tapping

- Tighten the screw tap.
- Clamp the workpiece.
- Release emergency stop.
- Close drill chuck protection.
- Place the tap on the workpiece with the drilling lever and set the workpiece zero point.
- Select tap as tool.
- Select material and tap size with the rotary knob and confirm with the rotary knob.
- Set the thread depth. ► Drilling or thread depth setting- Signal tone setting on page 24.
- Actuate spindle rotation ON.

The spindle rotates, make the threaded hole. If necessary, change the preset speed with the rotary knob.

The spindle begins to rotate as soon as the drilling lever is moved downwards.

Insert the screw tap in the workpiece; the screw tap is pulled into the workpiece. Move the spindle with the drilling lever, but do not exert any pulling force on the thread. After reaching the thread depth setting, the rotation direction reverses and the screw tap rotates back out of the workpiece.

The spindle stops rotating in the upper position.

The spindle begins to rotate again as soon as the drilling lever is moved downwards.

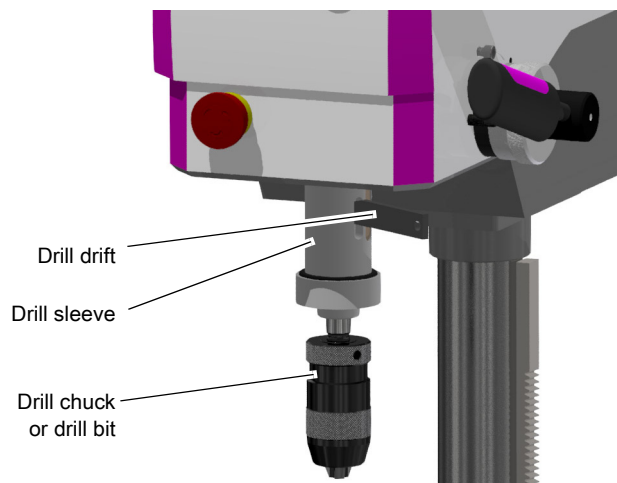
4.5 Removing the drill chuck from the MT2 spindle holding fixture

The drill chuck and the taper mandrel are loosened from the drill spindle by means of a drill drift.

WARNING!

Only disassemble the drill chuck if the drilling machine is disconnected from the electrical supply.

- Switch off the drilling machine on the master switch or disconnect the mains plug.
- Move the drill sleeve down.
- Turn the drilling spindle until the openings of the sleeve and of the drilling spindle are superimposed.
- Loosen the taper mandrel of the drill chuck with the help of a drill drift.

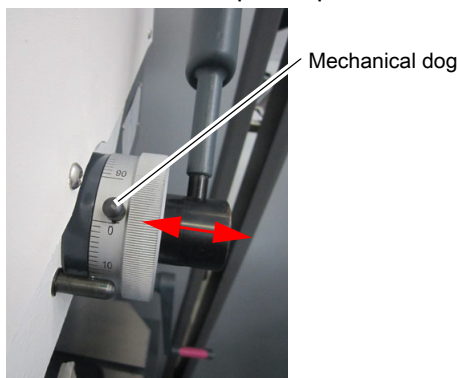


Img. 4-3: Removal

4.6 Adjustment of the mechanical drilling depth

To adjust the mechanical drilling depth.

- Pull out the drilling depth stop.
- Turn the drill depth stop.
- Push the drill depth stop back in.



Img. 4-4: Mechanical drill depth stop

4.7 Inspection and maintenance

Interval	Where?	What?	How?
every 50 hours	Spindle, Table mount, Column	Oiling	→ With non-corroding oil
as required	Drill Head Housing	Cleaning	→ with plastic cleaning agents
according to operator's, in accordance with German DGUV (BGV A3)	Electronics	Electrical inspection	▶ Obligations of the operating company on page 9 ▶ Electric on page 11 ▶ Electrical connection on page 19

5 Ersatzteile - Spare parts

5.1 Ersatzteilbestellung - *Ordering spare parts*

Bitte geben Sie folgendes an - *Please indicate the following :*

- ☐ Seriennummer - *Serial No.*
- ☐ Maschinenbezeichnung - *Machines name*
- ☐ Herstellungsdatum - *Date of manufacture*
- ☐ Artikelnummer - *Article no.*

Die Artikelnummer befindet sich in der Ersatzteilliste. *The article no. is located in the spare parts list.* Die Seriennummer befindet sich am Typschild. *The serial no. is on the rating plate.*

5.2 Hotline Ersatzteile - Spare parts Hotline



+49 (0) 951-96555 -118

ersatzteile@stuermer-maschinen.de



5.3 Service Hotline



+49 (0) 951-96555 -100

service@stuermer-maschinen.de



5.4 Ersatzteilzeichnungen - Spare part drawings

A Bohrkopf - Drilling head - Spindelaufnahme MK2 - Spindle seat MT2

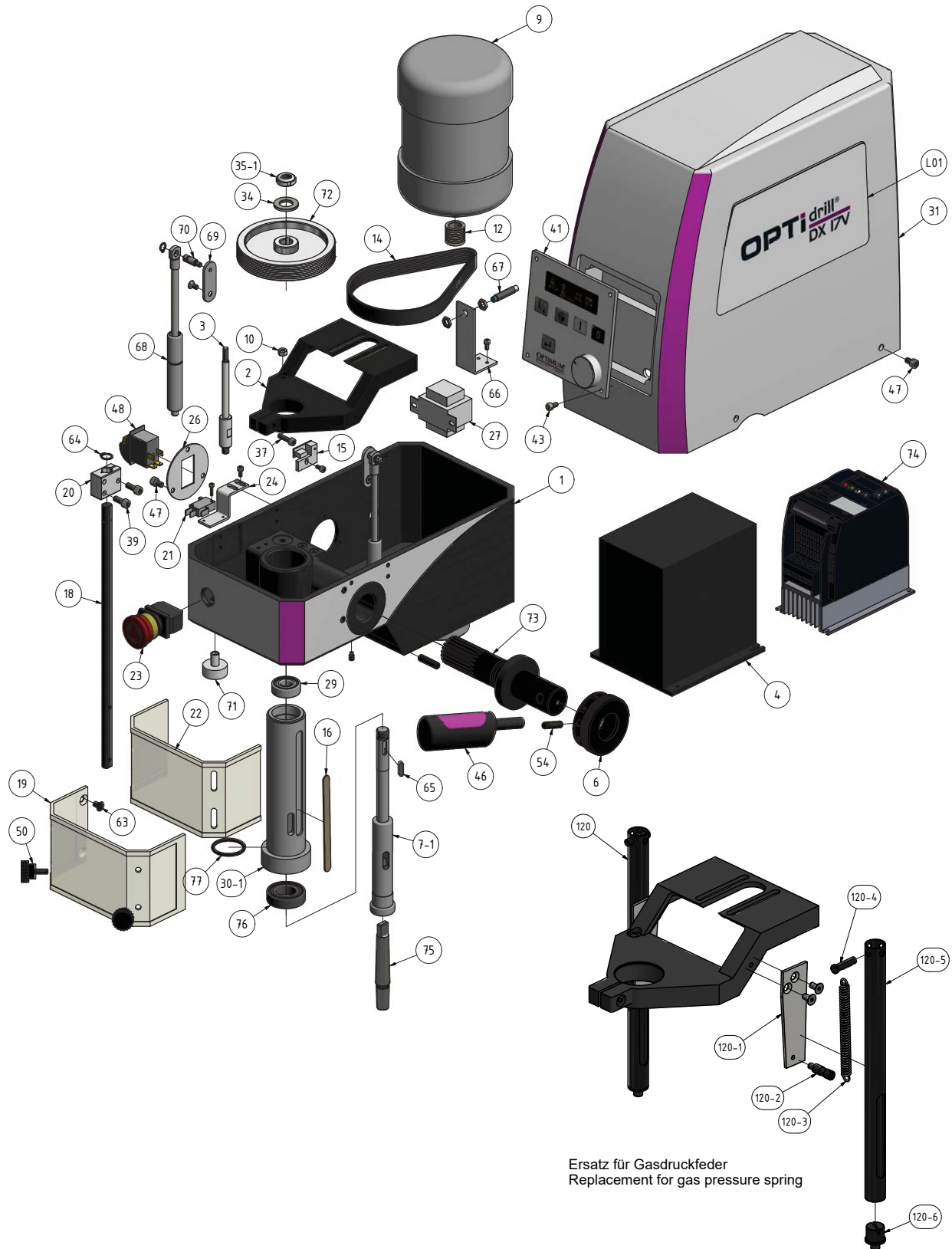
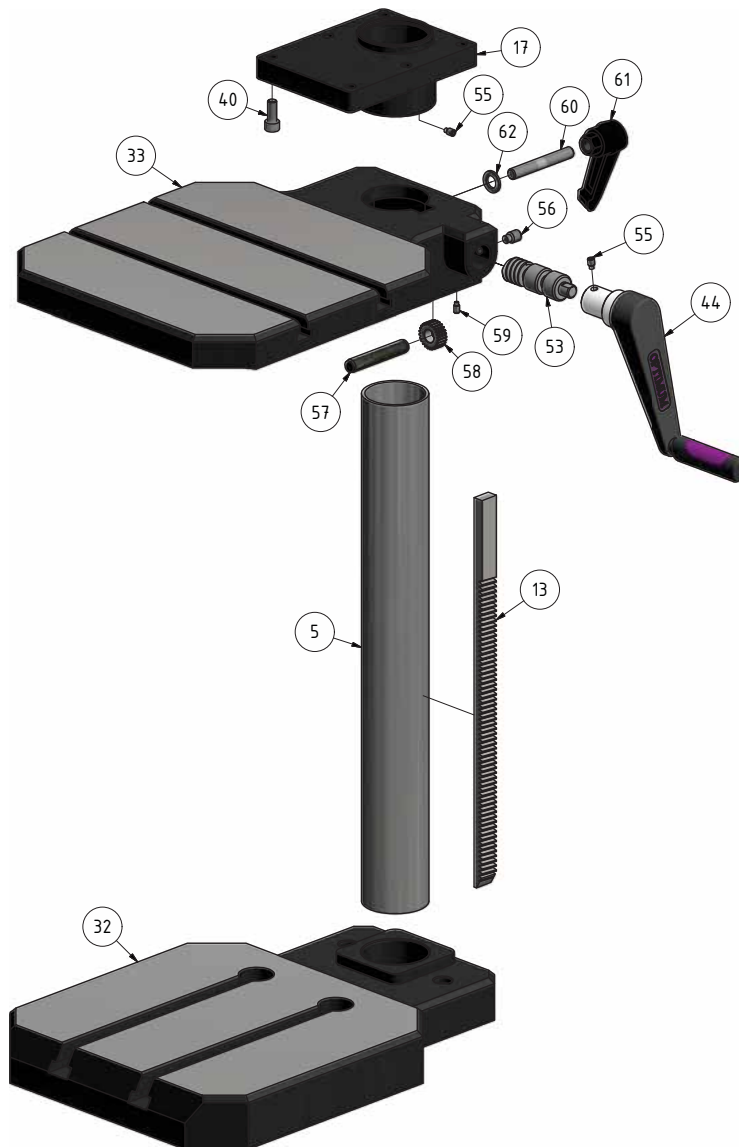


Abb.5-1: Bohrkopf - Drilling head - MT2

DX17V - Ersatzteilliste Bohrkopf - Spare part list drilling head					
Pos.	Bezeichnung	Description	Menge Qty.	Grösse Size	Artikelnummer Item no.
1	Gehäuse	Housing	1		0302017001
2	Motorhalter	Motor holder	1		0302016002
3	Bolzen	Bolt	1		0302017003
4	Abdeckung	Cover	1		0302017004
6	Skalenring	Scala ring	1		0302017006
7	Bohrspindel	Drill spindle	1	B16	0302016007
7-1	Bohrspindel	Drill spindle	1	MT2	03020170071
9	Motor	Motor	1		0302016009
10	Sechskantmutter	Hexagon nut	1	M6	
12	Riemenscheibe	Pulley	1		0302017012
14	Breitritzenriemen	Wide groove belt	1		0302016014
15	Sensor	Sensor	1		0302016015
16	Magnetstreifen	Magnetic strip	1		0302017016
18	Stange	Rod	1		0302017018
19	Bohrfutterschutz	Drill chuck cover	1		03003171207
20	Block	Block	1		0302017020
21	Mikroschalter	Micro switch	1		0302017021
22	Bohrfutterschutz	Drill chuck cover	1	komplett	0302017022
23	Not-Aus-Schalter	Emergency stop button	1		0302017023
24	Halter	Holder	1		0302017024
26	Abdeckung	Cover	1		0302017026
27	Transformator	Transformer	1		0302017027
28	Sechskantmutter	Hexagon nut	1	M16x1,5	
29	Kugellager	Ball bearing	1	6202	0406202
30	Pinole	Sleeve	1	B16	0302016030
CPL	Pinole	Sleeve	1		0302016030CPL
31	Abdeckung	Cover	1		
34	Unterlegscheibe	Wascher	1	DIN 125 - A 17	
35	Nutmutter	Grooved nut	1	B16	0302017035
35-1	Nutmutter	Grooved nut	1	MT2	03020170351
37	Innensechskantschraube	Socket head screw	1	ISO 4762 - M5 x 20	
39	Innensechskantschraube	Socket head screw	3	ISO 4762 - M6 x 16	
41	Steuerung	Control	1		0302016041
	Steuerung	Control	1	Color display	0302017041
43	Innensechskantschraube	Socket head screw	4	ISO 4762 - M5 x 10	
46	Hebel	Lever	1		0302017046
47	Innensechskantschraube	Socket head screw	7	ISO 4762 - M6 x 10	
48	Hauptschalter	Main switch	1		0302021846
50	Klemmschraube	Clamping screw	2		
54	Zylinderstift	Cylindrical pin	2	ISO 8734 - 8 x 30 - A	
63	Senkschraube	Screw	2	M6 x 10	
64	Sicherungsring	Retaining ing	1	DIN 471 - 12x1	042SR12W
65	Passfeder	Fitting key	1	5x5x18	042P5518
66	Winkel	Angle	1		0302017066
67	Sensor	Sensor	1		0302016067
68	Gasfeder	Gas spring	2		0302016068
69	Platte	Plate	2		0302017069
70	Bolzen	Bolt	2		
71	LED- Leuchte	LED- Lamp	2		0302017071
72	Riemenscheibe	Pulley	1		0302016072
73	Zahnwelle	Gear shaft	1		0302017073
74	SIEMENS SINAMICS V20	SIEMENS SINAMICS V20	1		0302017074
75	Morsekonus	Morse taper	1	MT2-B16	3050659
76	Kugellager	Ball bearing	1	6005-2Z	04060052Z
77	O-Ring	O-ring	1		0302017077
L01	Label	Label	2		03020170L01
120	Federrohr mit Feder komplett	Spring tube with spring, complete	2	Replacement for gas pressure spring	0302017068

B Säule und Bohrtisch - Column and drilling table



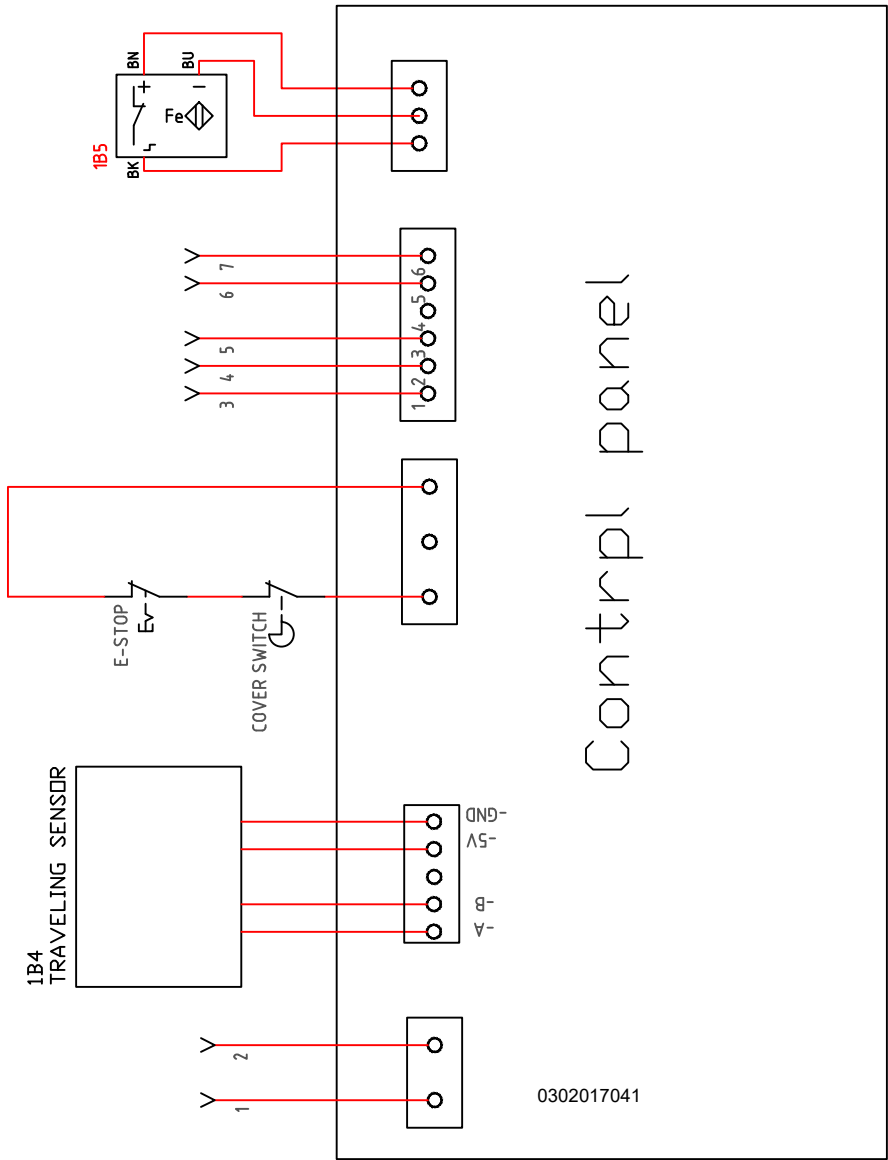
DX17V - Ersatzteilliste Säule, Bohrtisch - Spare part list column, drilling table					
Pos.	Bezeichnung	Description	Menge	Grösse	Artikelnummer
			Qty.	Size	Item no.
5	Säule	Column	1	bis Baujahr 09/2015	0302015505
5	Säule	Column	1	ab Baujahr 09/2015	
13	Zahnstange	Rack	1	bis Baujahr 09/2015	0302017013
13	Zahnstange	Rack	1	ab Baujahr 09/2015	
17	Flansch, quadratisch	Flange, square	1	alt/old	
17	Flansch	Flange	1	neu/new	0302017017
32	Maschinenfuss	Machine foot	1		0302017032
33	Bohrtisch	Drill table	1		0302017033
40	Innensechskantschraube	Socket head screw	4	ISO 4762 - M8 x 20	
44	Kurbel	Crank	2		0302016044
53	Schnecke	Worm	1		0302016053
55	Gewindestift	Grub screw	3	ISO 4028 - M6 x 10	
56	Gewindestift	Grub screw	3	ISO 4028 - M10 x 16	
57	Zylinderstift	Cylindrical pin	1	ISO 8734 - 12 x 70 - A	
58	Schneckenrad	Worm wheel	1		0302016058
59	Gewindestift	Grub screw	1	ISO 4028 - M5 x 10	
60	Bolzen	Bolt	1	16x89mm	0302017060
61	Klemmhebel	Clamping lever	1	M12	0302017061
62	Scheibe	Washer	1	M12	

C Bedienpanel - Operating panel - 0302016041

Abb.5-2: Schaltplan - Wiring diagram

Ersatzteilliste elektrische Bauteile - Spare part list electrical components - 0302016041					
Pos.	Bezeichnung	Description	Menge	Grösse	Artikelnummer
			Qty.	Size	Item no.
1S1	Hauptschalter	Main switch	1		0302021846
1M1	Antriebsmotor	Drive motor	1		0302016009
1U1	Frequenzumrichter	Frequency converter	1		0302017074
1S2	Not-Halt Schalter	Emergency stop button	1		
1S3	Schalter Bohrfutterschutz	Drill chuck switch	1		
1A3	Steuerpanel	Control panel	1		0302016041
1B4	Sensor Verfahrweg	Traveling sensor	1		
1B5	Näherungssensor	Proximity sensor	1		
1T7	Transformator	Transformer	1		
1G8	Netzteil	Power pack	1		
1H8	LED Lampe	LED Lamp	1		
1H9	LED Lampe	LED Lamp	1		

E



Ersatzteilliste elektrische Bauteile - Spare part list electrical components - 0302017041					
Pos.	Bezeichnung	Description	Menge Qty.	Grösse Size	Artikelnummer Item no.
1S0	Hauptschalter	Main switch	1		0302021846
M1	Antriebsmotor	Drive motor	1		0302016009
1U1	Frequenzumrichter	Frequency converter	1		0302017074
E-STOP	Not-Halt Schalter	Emergency stop button	1		
Cover switch	Schalter Bohrfutterschutz	Drill chuck switch	1		
Control panel	Steuerpanel	Control panel	1		0302017041
1B4	Sensor Verfahrweg	Traveling sensor	1		
1B5	Näherungssensor	Proximity sensor	1		
T1	Transformator	Transformer	1	~ 5V	03020170T1
T2	Transformator	Transformer	1	~ 12V	03020170T2
H1	LED Lampe	LED Lamp	1		
H2	LED Lampe	LED Lamp	1		
R	Netzdrossel	Line reactor	1		03020170R
1Z0	Netzfilter	Filter	1		030201701Z0

DX17V_parts.fm

6 Appendix

6.1 Copyright

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Subject to technical changes without notice.

6.2 Terminology/Glossary

Term	Explanation
Drill chuck	Drill bit adapter
Drill head	upper part of the drilling machine
Drill spindle	Shaft activated by the motor
Drilling table	Supporting surface, clamping surface
Taper mandrel	Cone of the drill or of the drill chuck
Drilling lever	Manual operation for the drill feed
Quick-action drill chuck	drill holding fixture to be clamped manually.
Workpiece	part to be drilled, part to be machined.
Tool	Drill bit, countersink, screw tap
Emergency stop	Stops the operation of a machine.
Emergency switching off	Interrupts the power supply of the machine.

6.3 Liability Claims for Defects / Warranty

Beside the legal liability claims for defects of the customer towards the seller, the manufacturer of the product, OPTIMUM GmbH, Robert-Pfleger-Straße 26, D-96103 Hallstadt, does not grant any further warranties unless they are listed below or were promised in the framework of a single contractual provision.

- The processing of the liability claims or of the warranty is performed as chosen by OPTIMUM GmbH either directly or through one of its dealers.
Any defective products or components of such products will either be repaired or replaced by components which are free from defects. Ownership of replaced products or components is transferred to OPTIMUM Maschinen Germany GmbH.
- The automatically generated original proof of purchase which shows the date of purchase, the type of machine and the serial number, if applicable, is the precondition in order to assert liability or warranty claims. If the original proof of purchase is not presented, we are not able to perform any services.
- Defects resulting from the following circumstances are excluded from liability and warranty claims:
 - Using the product beyond the technical options and proper use, in particular due to overstraining of the machine.
 - Any defects arising by one's own fault due to faulty operations or if the operating manual

is disregarded.

- Inattentive or incorrect handling and use of improper equipment
- Unauthorized modifications and repairs
- Insufficient installation and safeguarding of the machine
- Disregarding the installation requirements and conditions of use
- atmospheric discharges, overvoltage and lightning strokes as well as chemical influences
- The following items are also not subject to liability or warranty claims:
 - Wearing parts and components which are subject to a standard wear as intended such as e.g. V-belts, ball bearings, illuminants, filters, sealings, etc.
 - Non reproducible software errors
- Any services, which OPTIMUM GmbH or one of its agents performs in order to fulfil any additional warranty are neither an acceptance of the defects nor an acceptance of its obligation to compensate. Such services do neither delay nor interrupt the warranty period.
- Place of jurisdiction for legal disputes between businessmen is Bamberg.
- If one of the aforementioned agreements is totally or partially inoperative and/or invalid, a provision closest to the intent of the warrantor is considered agreed upon, which remains within the framework of the limits of liability and warranty which are specified by this contract.

6.3.1 Decommissioning

CAUTION!

Used devices need to be decommissioned in a professional way in order to avoid later misuses and endangerment of the environment or persons.



- Unplug the main power supply.
- Disconnect the connecting cable.
- Remove all environmentally hazardous operating fluids from the used device.
- If applicable remove batteries and accumulators.
- Disassemble the machine if required into easy-to-handle and reusable assemblies and component parts.
- Dispose of machine components and operating fluids using the intended disposal methods.

6.4 Storage

ATTENTION!

Incorrect and improper storage might result in damage or destruction of electrical and mechanical machine components.

Store packed and unpacked parts only under the intended environmental conditions.

Follow the instructions and information on the transport box.



- Fragile goods (Goods require careful handling)



- Protect against moisture and humid environment ► Ambient conditions
Temperature on page 12



- Prescribed position of the packing case (Marking of the top surface - arrows pointing to the top)



- Maximum stacking height
Example: not stackable - do not stack further packing cases on top of the first one.



- Consult Optimum Maschinen Germany GmbH if the machine and accessories are stored for more than three months or are stored under different environmental conditions than those specified here .

6.5 Note regarding disposal / options to reuse:

Please dispose of your machine in an environmentally friendly way, not by disposing of the waste not in the environment, but by acting in a professional way.

Please neither throw away the packaging nor the used machine later on, but dispose of them according to the guidelines established by your city council/municipality or by the corresponding waste management enterprise.

6.5.1 Disposal of new device packaging

All used packaging materials and packaging aids from the machine are recyclable and generally need to be supplied to the material reuse.

The packaging wood can be supplied to the disposal or the reuse.

Any packaging components made of cardboard box can be chopped up and supplied to the waste paper collection.

The films are made of polyethylene (PE) and the cushion parts are made of polystyrene (PS). These materials can be reused after reconditioning if they are passed to a collection station or to the appropriate waste management enterprise.

Only forward the packaging materials correctly sorted to allow direct reuse.

6.5.2 Disposing of the old device

INFORMATION

Please take care in your interest and in the interest of the environment that all component parts of the machine are only disposed of in the intended and admitted way.

Please note that the electrical devices comprise a variety of reusable materials as well as environmentally hazardous components. Please ensure that these components are disposed of separately and professionally. In case of doubt, please contact your municipal waste management. If appropriate, call on the help of a specialist waste disposal company for the treatment of the material.



6.5.3 Disposal of electrical and electronic components

Please make sure that the electrical components are disposed of professionally and according to the statutory provisions.

The machine is composed of electrical and electronic components and must not be disposed of as household waste. According to the European Directive 2011/65/EU regarding electrical and electronic used devices and the implementation of national legislation, used power tools and electrical machines need to be collected separately and supplied to an environmentally friendly recycling centre.

As the machine operator, you should obtain information regarding the authorised collection or disposal system which applies for your company.

Please make sure that the electrical components are disposed of professionally and according to the legal regulations. Please only throw depleted batteries in the collection boxes in shops or at municipal waste management companies.

6.6 Disposal via municipal collection

Disposal of used electrical and electronic components

(Applicable in the countries of the European Union and other European countries with a separate collecting system for those devices).



The sign on the product or on its packing indicates that the product must not be handled as common household waste, but that it needs to be disposed of at a central collection point for recycling. Your contribution to the correct disposal of this product will protect the environment and the public health. Incorrect disposal constitutes a risk to the environment and public health. Recycling of material will help reduce the consumption of raw materials. For further information about the recycling of this product, please consult your District Office, the municipal waste collection station or the shop where you have bought the product.

6.7 Change information operating manual

Chapter	Short summary	new version number
2 + 4 + Spare parts	3020165 Spindle seat MT2	1.0.1
1	EMC categories	1.0.2
parts	Spare parts drawing MT2 with adapter MT2-B16	1.0.3
3	Interdepartmental transport	1.0.4
2 + 4	Colour display ; spare parts drawing B16 spindle removed	2.0
parts	Spare parts drawing spring tube vs. gas spring	2.0.1
parts	Colour display, wiring diagram added	2.0.2

6.8 Product follow-up

We are required to perform a follow-up service for our products which extends beyond shipment.

We would be grateful if you could send us the following information:

- ☐ Modified settings
- ☐ experiences with the bench drill and upright drill, which could be important for other users
- ☐ Recurring failures

Optimum Maschinen Germany GmbH; Dr.-Robert-Pfleger-Str. 26; D-96103 Hallstadt

Fax +49 (0) 951 - 96 555 - 888

email: info@optimum-maschinen.de

EC Declaration of Conformity

according to Machinery Regulation 2023/1230 Annex V Part A

**The manufacturer/
distributor:** Optimum Maschinen Germany GmbH
Dr.-Robert-Pfleger-Str. 26
D - 96103 Hallstadt

hereby declares that the following product

Product designation: Bench drilling machine

Type designation: DX17V

Manual bench drilling machine with frequency converter for speed control, for workshops and industrial plants, which meets all the relevant provisions of the above mentioned Machinery Regulation as well as the other directives applied (below) including their amendments in force at the time of declaration.

The following additional EU directives have been applied:

EMC Directive 2014/30/EU ; Restriction of the use of certain hazardous substances in electrical and electronic equipment 2015/863/EU

The following harmonized standards were applied:

EN 12717: 2009-07 Safety of machine tools - Drilling machines

EN 60204-1: 2019-06 Safety of machinery - Electrical equipment of machines - Part 1: General requirements

EN 13849-1: 2016-06 Safety of machinery - Safety related parts of controls - Part 1: General design principles

EN 13849-2: 2013-02 Safety of machinery - Safety related parts of controls - Part 2: Validation

EN ISO 12100: 2011-03 Safety of machinery - General principles for design - Risk assessment and risk reduction

EN 50370-2: 2003-08 Electromagnetic compatibility (EMC) - Product family standard for machine tools - Part 2: Immunity

EN 55011: 2022-05 Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement - class A

EN 61000-3-2: 2023-10 Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)

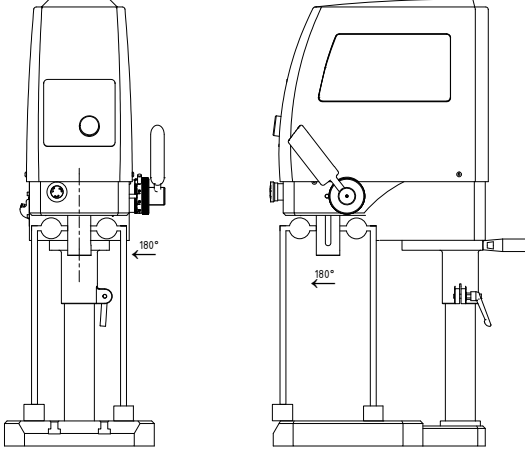
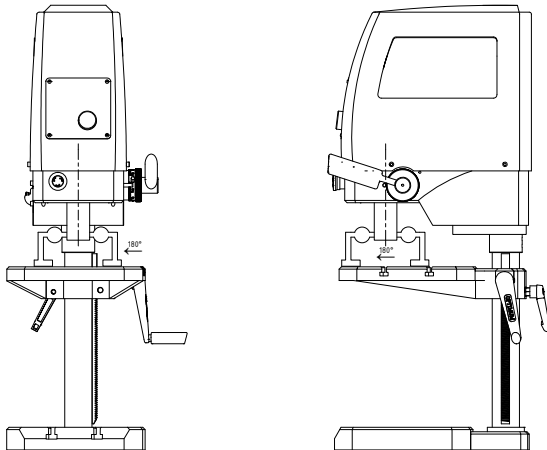
EN 61000-3-3: 2023-02 Electromagnetic compatibility (EMC) - Part 3-3: Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection

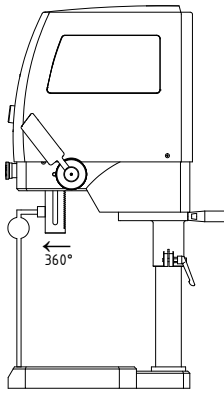
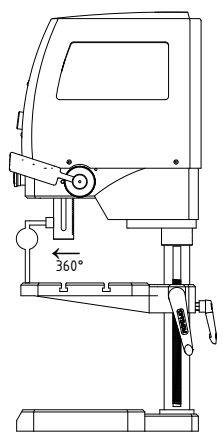
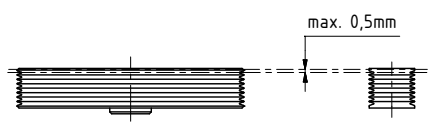
Responsible for documentation: Kilian Stürmer, phone: +49 (0) 951 96555 - 800

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Kilian Stürmer (CEO, General Manager)
Hallstadt, 2023-11-07

Nr. No.	Testobjekt Object of testing	Zeichnung Drawing	Toleranz Tolerance [mm]	Messwert Measured value [mm]
1	Spindelrundlauf der Kegelaufnahme <i>Spindle concentricity of the cone-type holder</i>	nur für DX 13V - DX 13V only 	a) an der Spindelnase <i>at spindle nose</i> 0.02 b) in einem Abstand von 60 mm <i>at a distance of 60 mm</i> 0.035	a) b)
1	Spindelrundlauf der Kegelaufnahme <i>Spindle concentricity of the cone-type holder</i>	nur für DX 15V und DX 17V - DX 15V and DX17V only 	a) an der Spindelnase <i>at spindle nose</i> 0.02 b) in einem Abstand von 60 mm <i>at a distance of 60 mm</i> 0.035	a) b)

Nr. No.	Testobjekt Object of testing	Zeichnung Drawing	Toleranz Tolerance [mm]	Messwert Measured value [mm]
2	Winkligkeit der Spindelachse zum Bohrtsch <i>Angularity of the spindle axis to the drilling table</i>	nur für DX 13V - DX 13V only 	a) 0.05 / 200 b) 0.05 / 200	a) b)
2	Winkligkeit der Spindelachse zum Bohrtsch <i>Angularity of the spindle axis to the drilling table</i>	nur für DX 15V und DX 17V - DX 15V and DX17V only 	a) 0.05 / 200 b) 0.05 / 200	a) b)
3	maximale Höhendifferenz der Riemenscheiben <i>Maximum height difference of the pulleys</i>		0.5	

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